DOCUMENT RESUME

ED 171 344 JC 790 342

AUTHOR Moore, Claude S.; Griffin, Bennie I.
TITLE Analysis of Teaching Techniques: Individualized Instruction-Programmed Instruction vs. Programmed Instruction Supplemented by Videc Tape Presentations.
PUB DATE May 77
NOTE 68p.; Graduate seminar paper, Virginia Polytechnic Institute and State University

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Academic Achievement; Algebra; Autoinstructional Aids; Community Colleges; *Junior Colleges; *Mathematics Instruction; *Programed Instruction; Remedial Mathematics; Student Opinion; *Teaching Methods; *Videotape Recordings

ABSTRACT

To determine the effects of videotape supplements to the programmed instruction used in developmental mathematics at Danville Community College (Virginia), videotapes and supplements (study time record, instructions, flow chart, prefatory information, index of tapes, objectives, exercises, and summary) were produced for four units of Algebra I. Three groups of students were randomly chosen: (1) the control group--used programmed texts and received instructor and peer assistance during class; (2) an experimental group--used programmed texts supplemented by videotapes; and (3) a non-control group--used programmed texts, received instructor and peer assistance, and used the tapes if they desired. Course grades, unit test scores, and scores on the Mathematics Opinionnaire, which measured enjoyment, motivation, importance and fear, were used to evaluate student achievement. The study revealed that: the performance of students who previously studied algebra was superior; there was no significant difference in the effects of different treatments; there was no significant difference between mean changes in opinion toward math among the groups, though the overall change in opinion of the experimental group was positive and that of the control and non-control groups negative. A videotape supplement, "Integers & Equations Having Integers as Solutions," and a bibliography are included. (AYC)

V.P.I. & S.U.

College of Education

Analysis of Teaching Techniques

Individualized Instruction-Programmed Instruction vs. Programmed Instruction Supplemented by Video Tape Presentations

to Professor Mike Moore

Submitted in partial fulfillment of course requirements for EDCI 5970 - Independent Study

Claude S. Moore
Bennie L. Griffin

May, 1977

ABSTRACT

EDCI 5970 - Independent Study "Analysis of Teaching Techniques - Individualized Instruction-Programmed Instruction vs. Programmed Instruction Supplemented by Video Tape Presentations"

This study evaluates the effect of video tape supplements to the programmed instruction used in developmental mathematics at Danville Community College (DCC). This study considers the psychological theories of learning as they relate to individualized instruction in mathematics. Included is a summary of research conducted in the area of individualized instruction and also individualized instruction supplemented by audio-tutorial and video tape approaches to facilitating learning. The needs in personnel, materials, and facilities are included. Suggested structure and implementation of the course are discussed. The study tested the hypothesis that programmed instruction in mathematics supplemented by video tape presentations would improve the achievement in and opinion toward mathematics of those students in the study.

The performance of students who had previously studied algebra (Group B2) was superior to that of students who had not previously studied algebra (Group B1). There was no significant difference between methods of presentation and no significant difference in opinion change toward mathematics. The following recommendations were made: (1) The study should be conducted over a longer period of time in order to involve more students. (2) Tapes should be produced for other units which cause students difficulty. (3) Other mathematics instructors should be involved in the production of tapes. (4) A video tape playback unit should be made available for use within the developmental mathematics classroom.

TABLE OF CONTENTS

*Not included because of format (bound in booklet form - 5 1/2 in. by 8 1/2 in.). These pertain to course operation not use of video tapes.

**Only one sample copy included.

***Not included because it is for sale.

TABLE OF TABLES

TABLE OF FIGURES

INTRODUCTION

During many years and numerous studies, educators have found that not all student learning is facilitated by the same methods and techniques. Since community college students tend to have widely varied social, educational, and economic backgrounds, various teaching methods and techniques are essential for effective community college teaching.

Improvement of Developmental Studies at DCC

In approximately a decade of teaching developmental studies using a variety of approaches, the writers have developed an individualized instructional approach using programmed materials. Individualized instruction was chosen because the traditional lecture method could not meet the needs of the students with the available facilities and finances. A variety of techniques have been used to facilitate the learning of the students. Some of these were (1) individual instructional help, (2) peer tutors, (3) spot lectures, (4) auto-tutors, and (5) lecture-discussion.

It was the intent of this project to implement a technique which would incorporate the spot lecture and auto-tutor methods. According to Garten (1975),

> The use of modeling is probably one of the most widely used and recognized approaches to teaching skill-type learnings. Hoover, in referring to the psychomotor domain, noted that the first stage in learning a skill is often dependent upon careful observation of a more experienced

person in his performance of the skill.[1]

The writers proposed to implement this technique by supplementing programmed instruction with video tape presentations. Because of scheduling instructors and students, the spot lectures were not very practical on a regular basis. However, the writers felt that the video tape presentations would be more feasible because students could view a tape without the presence of the instructor. An additional advantage of the video tapes was that they could be used as a review for students enrolled in non-developmental math courses.

Personal and Professional Development

The development of these tapes aided each of the writers in improving their teaching techniques. In the production of the tapes, the writers had opportunity to analyze their personal strengths and weaknesses. As a result of this analysis by them and by other professionals, they improved their techniques by reinforcing their strengths and eliminating some weaknesses.

Partial Fulfillment of Requirements for EDCI 5970

This study, to compare the effectiveness of programmed instruction against programmed instruction supplemented by video tape presentations,

[1] K. H. Hoover. Learning and Teaching in the Secondary School. Boston: Allyn and Bacon, 1968.

was conducted between June, 1976 and March, 1977. It was hoped that other faculty members would take an interest in this project and develop tapes for their courses. This may serve as part of DCC's staff development programs in the future.

RELATED LITERATURE

Individualized instruction is generally described as a process involving means of determining what a student needs to know and how a student learns best (Sherman, 1975). Because of the complexity of assessing a student's achievement and prescribing a plan of study, many teachers begin individualizing instruction, but soon return to the traditional lecture-discussion method. In an effort to simplify the process of individualized instruction, many different approaches to individualization have been attempted in recent years. Some of the many approaches are tracking, differentiated assignments, team teaching, flexible scheduling, computer-based instructor, movies, video tapes, audio tapes, and teaching machines (Willoughby, 1976).

With the advancement of technology, two of the more modern approaches to individualized instruction are now more feasible. These two approaches are computer-assisted and video-assisted instruction. Two multi-million dollar computer systems developed for instructional purposes are the PLATO and TICCIT systems (Magarrell, 1976). Both systems provide individualized instruction with two-way communications between the student and the

machine. According to Scully (1974), video-assisted instruction is coming to the forefront of education because "the vast majority of them [students] grew up with television as a significant part of their cultural environment..." (Scully, p. 10). "As Stanford's President Richard W. Lyman notes, they view as one of their most important tasks the weaning of students away from the tube" (Scully, p. 11).

According to Lanier (1976), sometime in the near future it will be possible for people at home and elsewhere to take a video disk and, by placing it on a player attached by wire to a television, play his desired program or lesson. States are spending large sums of money on video tapes to facilitate learning in schools today. As production increases and prices decrease, it will be feasible for schools and individuals to produce local, relevant materials for instructional purposes.

The question which was raised was "Does an individualized approach to instruction in mathematics produce better results than a traditional lecture-discussion approach?" Another question with which the writers were concerned was "Does individualized instruction supplemented by video tapes produce better results than individualized instruction without?" Although the first question has been considered by many educators and researchers, few studies have dealt with individualized instruction for college students. According to Egan and others (1976), of the total 24 summaries, 52 articles, and 545 dissertations listed in the November, 1971 and November, 1972 Journal for Research in Mathematics Education

only one concerned individualized instruction in secondary or college mathematics. Similar results were found in 1973 and 1974. Of 145 studies of individualized instruction in mathematics (128 dating from 1960 to 1974) reported by Miller (1976), only 8 considered the achievement and only 3 considered the attitude of college students relative to mathematics.

After a one-year study involving 50 students using traditional instruction and 149 students using individualized instruction, Hollick (1970) reported a significant difference favoring the individualized group in mathematics achievement. Also, he reported that the attitudes of the individualized group toward mathematics were better than those of the traditional group.

Ludeman (1973) conducted a study involving ninth grade algebra. The objectives of the program were to increase achievement in mathematics and to create a positive attitude toward mathematics. For the 36-week program, materials were written and used with audio-visual lessons recorded on video tape cassettes. Although none of the experimental group spent 36 weeks studying algebra and all of the control group did, the achievement scores for the two groups were almost identical. Experimental students who finished more than 20 weeks of video tape instruction scored significantly higher than the control group. Ludeman also reported that the experimental group had a more positive attitude toward mathematics; 65% of the experimental group improved their attitude toward mathematics.

Morman (1973) conducted a study to compare the use of the

audio-tutorial method of instruction with the tratitional lecture-discussion method while teaching remedial mathematics in a junior college. Morman found no significant difference in achievement; however, the experimental group had a more positive attitude toward mathematics than the control group. Twenty-seven of the 30 experimental students wished to take another audio-tutorial method course.

In response to the question posed concerning the eff veness of programmed instruction supplemented by video tape p tion, it was felt by the writers and others that video tapes would produce significant improvement in learning. Garten (1975) who used video tape assisted instruction to teach prospective teachers said:

> With a greater movement to an experimental and competency based program of teacher preparation, this aspect [video tape assisted instruction] of developing teaching skills possesses potential. With additional researching..., ...the modeling of various teaching skills through a self-instruction approach which utilizes video tape presents a valuable tool for programs in teacher preparation and improvement of instruction.

INSTRUCTIONAL EQUIPMENT, MATERIALS, AND FACILITIES

The personnel needed for this study are classified as instructional staff and assistants, technical staff, and students. There were two instructional staff members. They were responsible for the development and presentation of content as well as direction of the production. The instructional staff were also responsible for the implementation and final report of the study. The instructional assistants helped administer tests and keep records. The technical staff included persons responsible for such things as final art work, makeup, cameras, lights, and control panel. The use of students and other instructional staff members is discussed in the section Structure of Course.

The classroom assigned for developmental mathematics was not large enough to be equipped with study carrels or the storage space necessary for a media project of this nature. In order to meet the needs for this experiment and for continued use of the method, the writers sought the help of the Audio-Visual Department Staff and the Library Staff. The Audio-Visual Deaprtment made available necessary materials and equipment -- both software and hardware -- and kept the equipment in good condition. The Audio-Visual Department was limited in space so help of the library staff was sought to facilitate implementation. Members of the library staff were most helpful in the implementation of the experiment. They provided adequate space for the playback units and catalogued each tape so it could be checked out to help with the record keeping. The writers were very pleased with the excellent cooperation that both the library and audio-visual staffs extended throughout the whole experiment.

The major equipment and materials used in the operation of the

experiment were:

1. T.V. studio and control room (2 T.V. cameras)
2. Two Sony video tape recorders (1 inch)
3. One Sony video tape cassette recorder ($\frac{3}{4}$ inch)
4. Two Sony video tape cassette playback units equipped with headsets

*5. Information manuals for each unit

*6. Programmed textbooks

*7. Tests (Pre-test and Post-test)

*8. General information manuals for Developmental Studies and Developmental Mathematics

* Discussed in later sections.

The cassette format was chosen because it could be individually operated with ease. Each student could view a tape or part of a tape as many times as desired and at anytime during regular library hours. The use of closed-circut T.V. was considered, but the availibility of rooms and other places equipped with monitors and additional personnel made this method impractical.

METHODS

While conducting this study, the writers were concerned with ways of affecting learning, the structure and implementation of the course, and the evaluation of the course.

Ways of Affecting Learning

In research done by the writers and in discussions with colleagues,

there was evidence of one predominant concern: that of determining just what the present day student knows and precisely how he learned what he knows. What techniques can be used to help students bridge the gap between what exist in their knowledge and what they need to know and be able to utilize?

At the time of this study, four branches of psychology are trying to explain how learning takes place: Freudian, Behavorial, Humanistic, and Transpersonal. Most recently, Transpersonal psychology evolved to explore those untouched areas of learning and consciousness such as voluntary control of the interstate psychic phenomena or biofeedback.

Left brain	Right brain
Cognitive	Pictorial
Verbal	Pre-verbal

Figure 1. Psychology of Transpersonal Domain

There is a noticable difference in students that have been educated mostly by TV and those that received their formal education before the age of television. These present-day students have more of a right-hemisphere education. (See Figure 1.) They have a difficult time in verbal communication and with analytical thinking, so there is a need to devise methods of teaching that will make use of their advanced right-hemisphere development. For some, it may appear that these young people have become a generation of non-thinkers in the traditional sense. But, they are thinking inductively and intuitively, not in our "outmoded" method.

A well balanced functioning of the total brain produces an integrated student who uses imagery, intuition, creativity, and induction as a base for both analysis and synthesis in the rational thinking process.

The degree of success of instruction, whether it be individualized instruction or a formal educational process, is determined by the degree to which the instructional staff perform their duties of incorporating techniques that will insure that the total brain will become an integral functioning materials-center. These duties include taking the student where he is now and incorporating the cognitive, affective, and transpersonal domains into a fully functioning human. Flexibility is a key method in effectively applying these approaches successfully.

In order for any method of instruction to be fully effective, the teachers should plan to implement the following conditions in a learning situation:

1. Provide for establishment of specific objectives (behavioral and general)
2. Provide for motivation
3. Provide for reinforcement (feedback)
4. Provide for retention and integration
6. Provide for performance of the stated objective

The following objectives were emphasized in the development of the video tapes:

1. Cognitive Objectives - emphasize what the student is to know
2. Affective Objectives - concerned with beliefs, attitudes, values, and perceptions

3. Performance Objectives - concerned with specific behaviors that the student must be able to demonstrate (These are specific objectives or Behavioral Objectives.)

4. Consequent Objectives - these are the hardest kind to make use of because they usually produce feedback after the student has completed the course or program.

Induction, synthesis, and pre-verbal thinking, as well as deduction, analysis, and verbal thinking must be incorporated in behavioral objectives. Since behavioral objectives tend to place emphasis on the end result and not the means by which the result was obtained, there must be other objectives incorportated into all learning situations. These objectives must emphasize the process of education (not always immediately measurable) as well as the end results. Most students need qualities such as resourcefulness, curiosity, inventiveness, flexibility, and also a usable skill. A machine cannot produce these qualities. It was hoped that the video tapes, with an instructor presenting illustrations, would aid significantly in the development of the above qualities.

Structure and Implementation of the Course

The structure of this course was an in-class individualized instructional approach using programmed textbooks. To aid in the use of the textbooks, there were two information manuals. One of these manuals contained general information about developmental studies at Danville Community College. The other manual contained specific information relating to developmental mathematics. The following are the section headings of the latter manual:

1. Philosophy of Developmental Studies

2. Introduction
3. Suggestions and Requirements
4. Testing
5. Grading
6. Booklist

The writers chose four units of Algebra I as the content for study. These were chosen because many students had experienced much difficulty with them in the past. Video tapes were produced for each unit to coordinate with the programmed textbooks used. Since the experimenters felt that asking students to do more than one unit under strict experimental conditions would be unfair to the students, one unit was randomly chosen to be used as the "truely" experimental unit. Figure 2 lists the topic covered in each and the numbers of the tapes on which the presentations are recorded. A supplement for the tapes for each unit was prepared. Each student who viewed the tapes was given the appropriate supplement. Each supplement contained study time record, cassette video tape playback instructions, flow chart, preface (information for student), index of tapes, objectives, exercises, and summary. (Copies of the supplements are in Appendix A.)

The instructional staff chose three groups of students. Group A1 was the control group which used programmed texts and received instructor and peer assistance during class. Group A2 was an experimental group which used programmed texts supplemented by video tapes for selected topics. Group A3 was a non-control group which used programmed texts, received instructor and peer assistance during class, and used the tapes if they wished to do so.

All three groups were randomly chosen, on the basis of their starting

positions at the beginning of the quarter, by using random digits to place students in three groups, and the groups were randomly assigned to a treatment. Once the students were in class, they began their formal orientation. Each student received a memorandum indicating his path of study (Appendix B).

Figures 3, 4, and 5 are flow charts which indicate the path a student follows while enrolled in Math 01 Developmental Mathematics at DCC. Before a student begins the course work, he is given a placement test. When this test is graded, the student has a conference with the instructor who, along with the student, decides in which level of the course the student should begin. The student then takes a pretest on the appropriate unit and follows the path indicated according to his success. Figure 3 shows the flow chart to be followed by the control group. Figures 4 and 5 show flow charts to be followed by the experimental and non-control groups, respectively. The solid lines indicate directions students must follow, and dashed lines indicate directions students may choose to follow. It should be noted that all pretests and posttests are administered and scored by the instructional staff and assistants. The conference indicated within the flow charts represent individual ones between a student and an instructor. During a conference, the instructor determines which direction the student should take.

Unit	Topic	Tape Numbers
1	Integers	263, 264, 265
2	Rational Numbers	266, 267, 268
3	Equations Involving Two Variables	270, 271, 272
4	Algebraic Polynomials Factoring, and Fractions	273, 274

Figure 2. Topical Outline and Tape Numbers

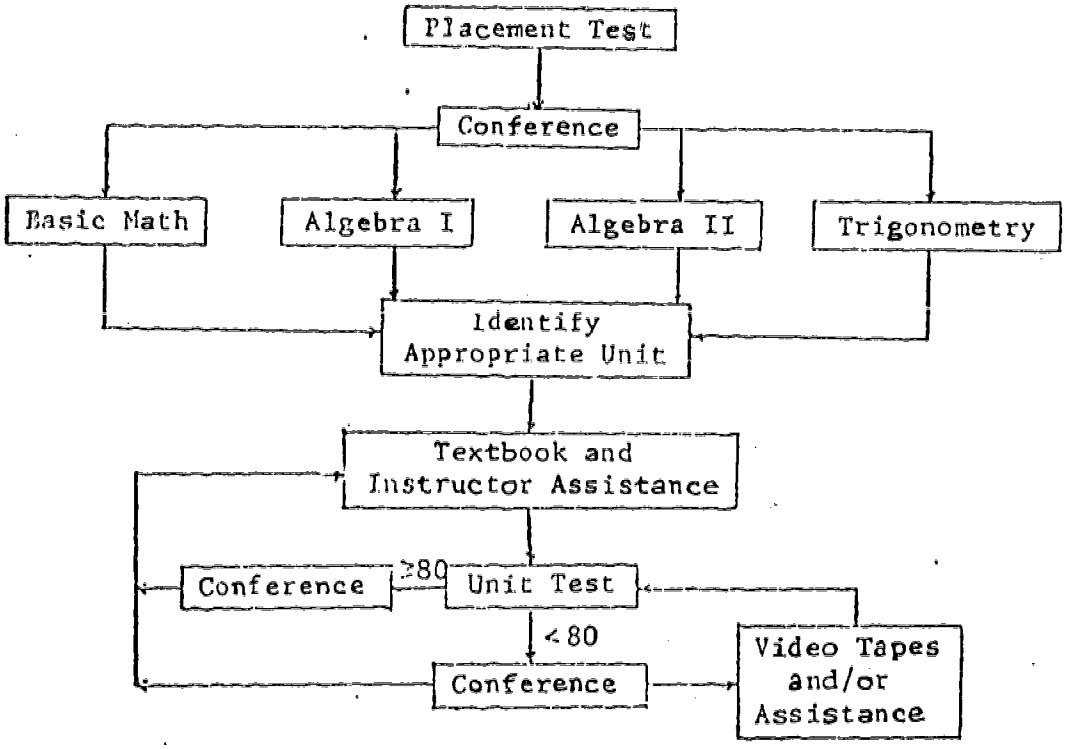


Figure 3. Flow Chart for Control Group (A1)

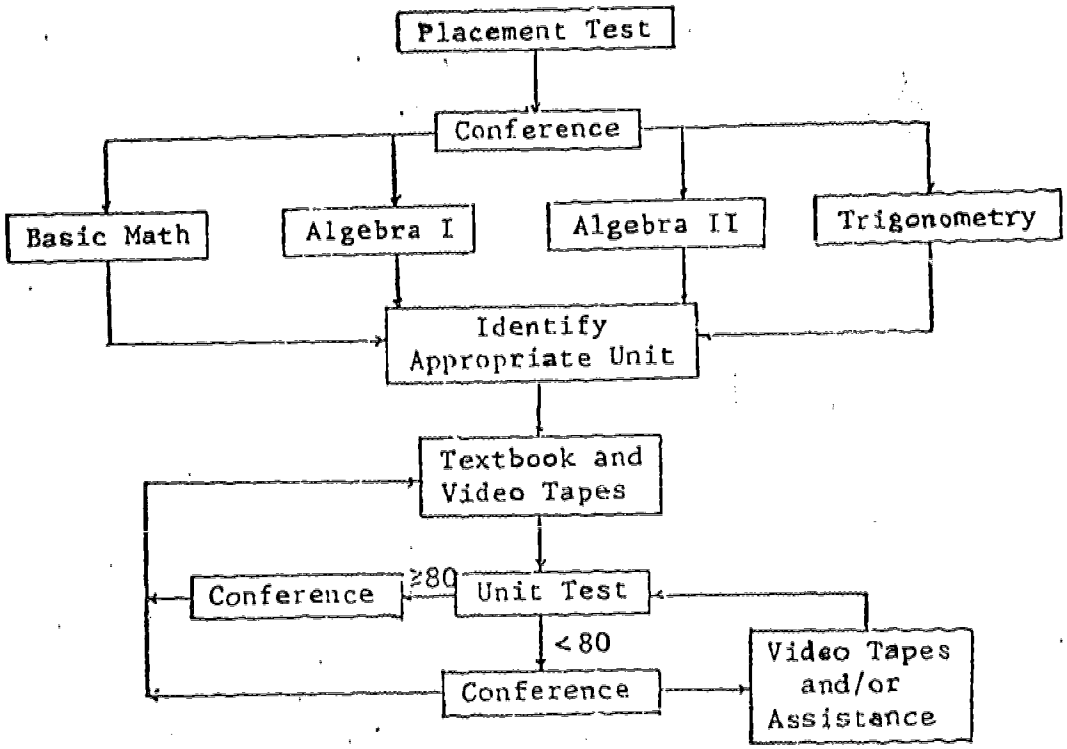


Figure 4. Flow Chart for Experimental Group (A2)

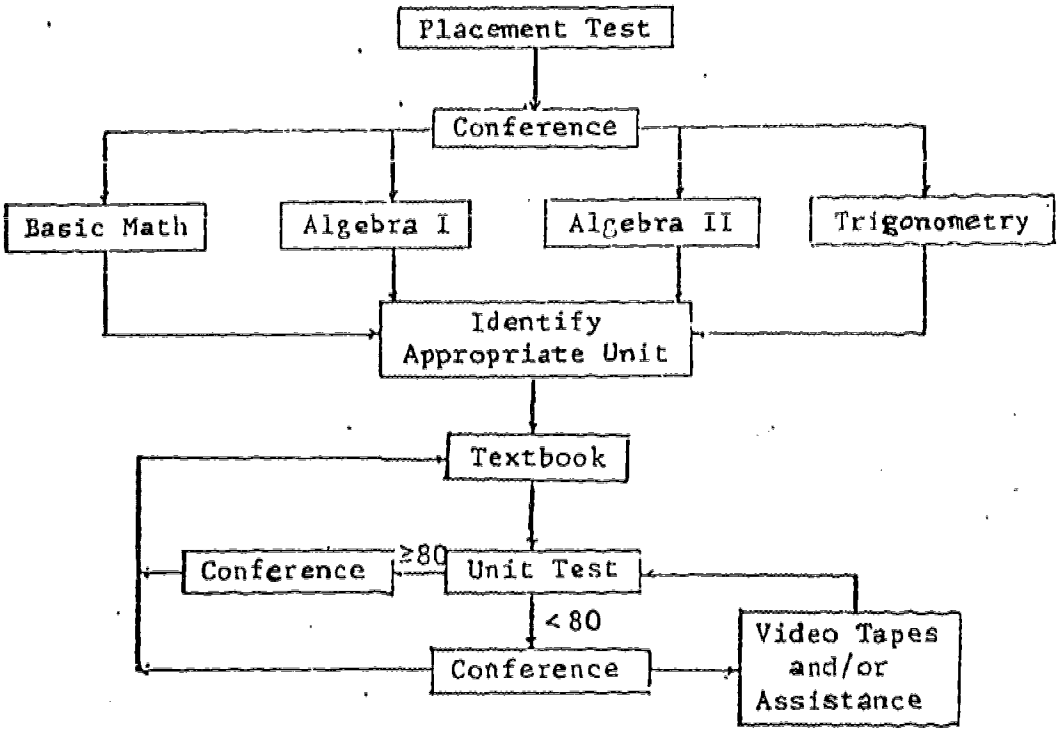


Figure 5. Flow Chart for Non-control Group (A3)

Evaluation of the Study

The evaluation of this study was conducted in two main areas: the cognitive and affective domains. The evaluation within cognitive domain involved students' course grades and unit test scores. (NOTE: Unit tests were developed by the writers. Unit Test 2, the experimental unit, has a reliability coefficient of r = 0.78 using the Kuder-Richardson Formula 20 and a concurrent validity of r = 0.86.) The evaluation within the affective domain used the Mathematics Opinionnaire (24 items; 4 - scales: enjoyment, motivation, importance, and fear) developed and validated by Dr. Lewis R. Aiken. (Note: The internal consistency (reliability) coefficients are: Enjoyment = 0.92, Motivation = 0.88, Importance = 0.80, Fear = 0.88, Total = 0.94.)

All students were administered the same teacher-made test at the conclusion of their study of Unit 2. The test was free-answer format involving computations (See Appendix B.). It was used as an achievement test; for those who did not pass, it was also used as a diagnostic test. The dependent variable for each student was his test score (based on 100 percent correct). Each student was given up to one hour in which to complete the test. Each student completed two copies of the Mathematics Opinionnaire (Appendix B), one at the beginning and one at the end of the quarter. The net change for each student was calculated and analyzed.

FINDINGS

This section contains the hypotheses and analysis of data for the 36 students who participated in this study.

Hypotheses

From the review of the related literature, the first hypothesis was generated; based on numerous teaching experiences, the writers developed the remaining hypotheses:

1. Students using video tapes supplements will perform better than students not using tapes.
2. Students who previously studied algebra will perform better than students with no algebra.
3. The change of opinion toward mathematics for students using tapes will be more positive than that for other students.
4. The change of opinion toward mathematics for students with no algebra will be more positive than that for students who previously studies algebra.

Analysis of Data

Groups A1, A2, and A3 were divided into Subgroups B1 (no previous study of algebra) and B2 (previous study of algebra). To test the hypotheses of this study, the following statistical analyses were applied:

1. a 2 x 3 factorial analysis of variance (ANOVA) for Unit Test 2;
2. a 2 x 3 factorial ANOVA for net change in opinion;
3. an r-correlation between opinion change and course grade.

The factorial analyses are summarized in Table 1 and Table 2. The F-values in Table 1 indicate (1) that the performance of students who previously studied algebra was superior; and (2) there was no significant difference in treatment effects and no significant interaction.

TABLE 1. Two-Way Analysis of Variance for Teaching Methods (A) and Previous Study of Algebra (B) Using Unit Test Scores.

Source	Sum of Squares	df	Mean Squares	F
Between Methods (A1,A2,A3)	753.56	2	376.78	1.34 (N.S.)
Between Study (B1,B2)	3802.78	1	3802.78	13.55*
Interaction (A x B)	80.23	2	40.12	0.14 (N.S.)
Within Groups	8418.99	30	280.63	
Total	13,055.56	35		

* Significant at $p < .01$

The F-values in Table 2 indicate that there was no significant difference between mean changes in opinion toward mathematics.

TABLE 2. Two-Way Analysis of Variance for Teaching Methods (A) and Previous Study of Algebra (B) Using Opinion Toward Mathematics.

Source	Sum of Squares	df	Mean Squares	F
Between Methods (A1,A2,A3)	23.17	2	16.59	0.15 (N.S.)
Between Study (B1,B2)	18.78	1	18.78	0.25 (N.S.)
Interaction (A x B)	64.57	2	32.28	0.42 (N.S.)
Within Groups	2285.49	30	76.18	
Total	2392.00	35		

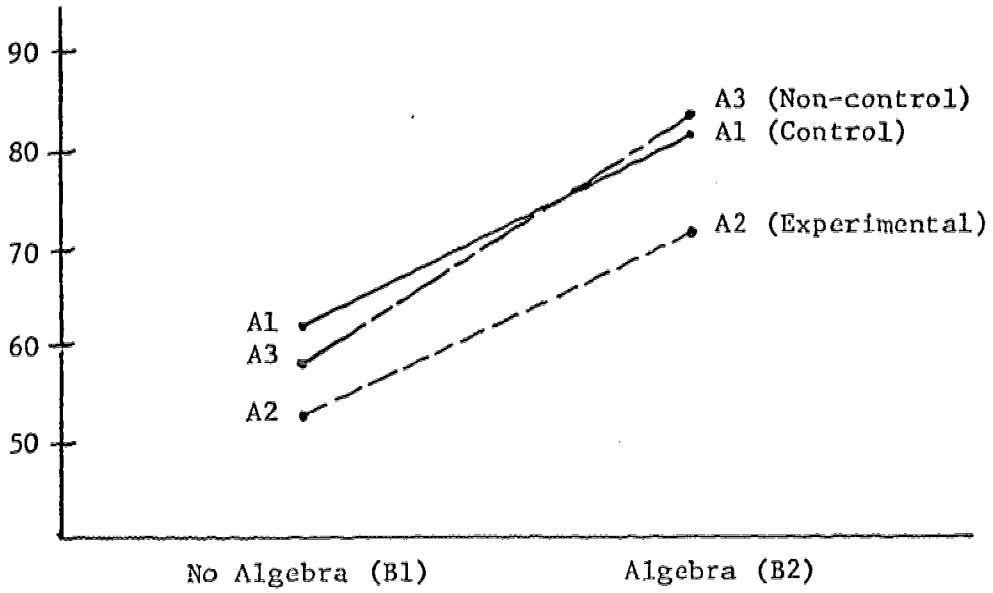


Figure 6. Mean Scores for Teaching Methods.

TABLE 3. Mean and Standard Deviation of Scores Within Groups (N = 6).

Group	Mean	Standard Deviation
Control (A1) No Algebra (B1)	62.2	14.38
Control (A1) Algebra (B2)	81.5	7.02
Experimental (A2) No Algebra (B1)	52.8	25.10
Experimental (A2) Algebra (B2)	70.5	14.74
Non-control (A3) No Algebra (B1)	58.5	16.38
Non-control (A3) Algebra (B2)	83.2	5.64

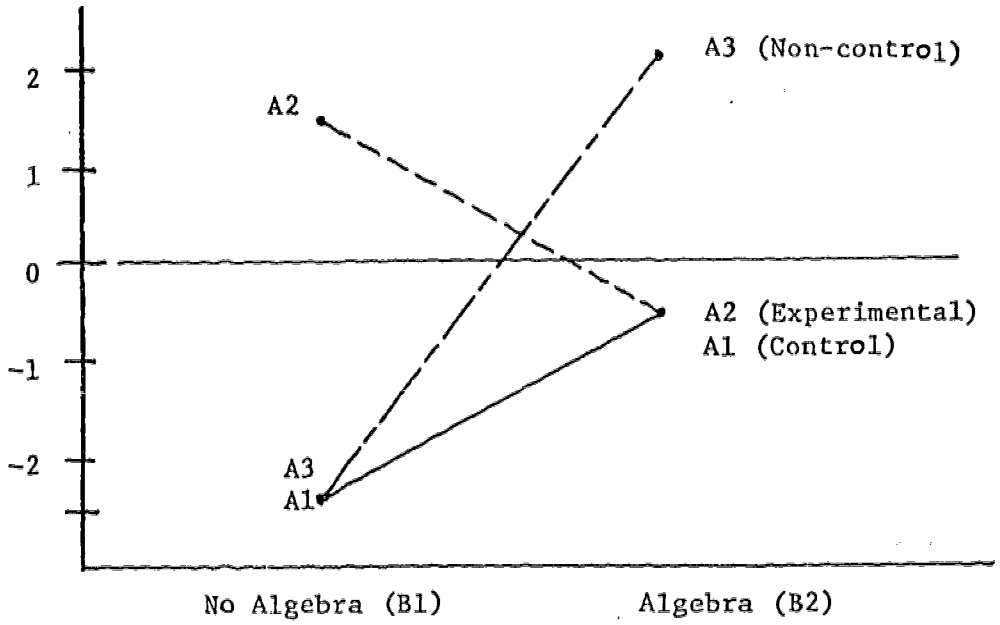


Figure 7. Mean Opinion Changes for Teaching Methods.

TABLE 4. Mean and Standard Deviation of Opinion Changes Within Groups (N = 6).

Group	Mean	Standard Deviation
Control (A1) No Algebra (B1)	-2.33	5.28
Control (A1) Algebra (B2)	-0.50	8.69
Experimental (A2) No Algebra (B1)	1.50	8.62
Experimental (A2) Algebra (B2)	-0.50	12.58
Non-control (A3) No Algebra (B1)	-2.33	5.22
Non-control (A3) Algebra (B2)	2.17	4.21

Table 5 shows the mean value ($\bar{x}$) for the opinion change for each of the six subgroups, the mean course grade ($\bar{y}$, on a numerical scale) for each subgroup, and the product-moment (r_{xy}) correlation between opinion change and course grade.

TABLE 5. Means and r-correlations for Change of Opinion (x) and Course Grade (y).

Group	$\bar{x}$	$\bar{y}$	r_{xy}
Control (A1) No Algebra (B1)	-2.33	0.33	-0.022
Control (A1) Algebra (B2)	-0.50	0.83	0.077
Experimental (A2) No Algebra (B1)	1.50	0.83	-0.380
Experimental (A2) Algebra (B2)	-0.50	1.00	0.620
Non-control (A3) No Algebra (B1)	-2.33	0.50	0.920
Non-control (A3) Algebra (B2)	2.17	1.17	0.549

NOTE: Course grade values used were: 0 for U*, 1 for R, and 2 for S. Opinion changes may range from +24 to -24.

* See manual in Appendix A for clarification of U,R, and S.

Although none of the correlation coefficients were significant, it was of interest to note the following:

1. Subgroups A2, B1 had an opinion change of 1.50 and a correlation of r = -0.380. Although their average course grade was below passing (R = 1.00), their opinion toward mathematics became more favorable.

2. Subgroups A3, B1 had an opinion change of -2.33 and a correlation of r = 0.920. These students had both a less favorable opinion toward mathematics and a course grade average below passing.

3. Subgroup A3,B2 had an opinion change of 2.17 and a correlation of r = 0.549. These students did well in the course (1.17 of possible 2) and became more favorable in their opinion toward mathematics.

CONCLUSIONS AND RECOMMENDATIONS

The findings indicated in Table 1 show the second hypothesis to be true at the 1% level of significance. This is to say that the performance of students who had previously studied algebra (Group B2) was superior to that of students who had not previously studied algebra (Group B1). However, the writers did not find a significant difference in teaching methods.

As indicated in Table 2 there was no significant difference in students' change of opinion toward mathematics. Table 4 indicates that for students who had studied algebra the more freedom a student had in choosing alternative methods of study the more positive his opinion toward mathematics. It should be noted that of Groups A1, A2, and A3 the overall opinion change of the Experimental Group (A2) was positive (0.50), whereas, the other two groups had negative overall changes (-1.27 for A1 and -0.08 for A3).

Based on comments from students and staff members involved with the study, the writers believe that the study was worth the effort, although not as successful as desired. Comments from students using the video tapes (Groups A2 and A3) indicate that freedom of choice in use of the tapes may increase the benefits derived from them. From the findings of the study and observations of the writers, the following recommendations were made:

1. The study should be conducted over a longer period of time in order to involve more students.
2. Tapes should be produced for other units which cause students difficulty.
3. Other mathematics instructors should be involved in the production of tapes.

4. A video tape playback unit should be made available for use within the developmental mathematics classroom.

BIBLIOGRAPHY

BIBLIOGRAPHY

Egan, Thomas A. and others. "An Investigation of The Implementation of an Individualized Approach to the Study of Mathematics within two College Freshman Survey Courses," A Report Present at the 54th Annual NCTM Meeting, April, 1976.

Garten, Ted R. and James A. Hudson. "A Self-Instructional Strategy: Learning Teaching Skills Through Video Tape," Educational Technology, October, 1975, pp. 50-51.

Hollick, H. Eugene. "The Future Now!," Educational Television, June 1970, pp. 11-18.

Lanier, Robin. "A Home T.V. Revolution, Video Disk," Media News, Winter 1975-76, Vol. 4, No. 5, p. 3.

Ludeman, Clinton, and others. "Final Evaluation Report, Project Video Tape Package Mathematics," Final Report of an ESEA Title III Project, 1973. ERIC: ED 086 545.

Magarrell, Jack. "Computerized Education: Time to Sink or Swim," The Chronicle of Higher Education, April 26, 1976, pp. 1, 9.

Miller, Richard L. "Individualized Instruction in Mathematics: A Review of Research," Mathematics Teachers, May 1976, pp. 345-351.

Morman, Shelba Jean. "An Audio-Tutorial Method of Instruction VS. the Traditional Lecture-Discussion Method, The Two-Year College Mathematics Journal 4 (Fall 1973): pp. 56-61.

Scully, Malcolm G. "Video on Campus: Where's the 'Revolution'?," Special Report from The Chronicle of Higher Education, May 38, 1974, pp. 9-12.

Sherman, Thomas M. "Individually Responsive Instruction: An Alternative Approach to Individualizing in a Large Group Setting," Educational Technology, October 1975, pp. 56-58.

Willoughby, Stephen S. "Individualization," Mathematics Teacher, May 1976, pp. 338-344.

APPENDIX A

SUPPLEMENT FOR VIDEO TAPES

Integers

&

Equations Having

Integers As

Solutions

Prepared by

Bennie L. Griffin

July, 1976

Purpose

The purpose of this supplement is to help you in your use of the video tapes on integers.

The purpose of the video tapes is to help you better understand the four basic operations (addition, subtraction, multiplication, and division) dealing with integers, and to help you master the techniques of solving simple equations having integers as solutions.

Foreword

The material presented in this supplement is the same as the material presented in a first course of Algebra for the set of integers. You should find the information in this supplement and the tapes for which this supplement was designed to be very beneficial to you in your study of the topics on the integers. Specific objectives of the unit are stated for you. Important properties (laws) are also stated and illustrated in this supplement. A major objective of this unit on integers is to present the information in such a way as to help you use induction and deduction to arrive at basic properties or laws.

In viewing the tapes on the integers, you should get the feeling that you are actively participating in the development of each property or law. Do not hesitate to repeat sections that you did not clearly understand the first time.

Contents

Objectives:

(1) You will be able to identify addition as a short form of counting in a positive direction

(2) You will be able to identify subtraction as a short form of counting in a negative direction

(3) You will be able to identify the following properties of counting numbers, whole numbers, and integers:

(a) Commutative property of addition with integers

$$a + b = b + a$$

(b) Associative property of addition with integers

$$(a + b) + c = a + (b + c)$$

(c) Commutative property of multiplication for the integers

$$(a)(b) = (b)(a)$$

(d) Associative law of multiplication for the integers

$$(a \cdot b) \cdot c = a \cdot (b \cdot c)$$

(e) Distributive law of multiplication over addition for the integers

$$a \cdot (b + c) = a \cdot b + a \cdot c$$

(4) You will be able to add and subtract sign numbers

(5) You will be able to multiply and divide sign numbers

(6) You will be able to identify the positive integers, negative integers, and zero from the number line

(7) You will be able to identify the following:

(a) Additive Identity

(b) Multiplicative Identity

(c) Additive Inverse

(8) You will be able to simplify expressions--such as:

(a) $3 \cdot -5 + 4$

(b) $(3 - {}^{-}4) + 6$

(c) $3 - {}^{-}3 \cdot {}^{-}4$

(9) You will be able to use the distributive law to add expressions--such as:

(a) $5a + 6a$

(b) $10b + {}^{-}13b$

(10) You will be able to identify and illustrate the following facts (properties):

(a) If two integers are positive, then their sum is a positive integer

(b) If two integers are negative, then their sum is a negative integer

(c) If the count of the positive integer is more than the count of the negative integer, then their sum will be a positive integer

(d) If the count of a positive integer and a negative integer are the same, then their sum is zero

(e) If the count of a positive integer is less than the count of a negative integer, their sum is negative

(f) If two integers are positive, then their product is a positive integer

(g) If two integers are negative, then their product is a positive integer

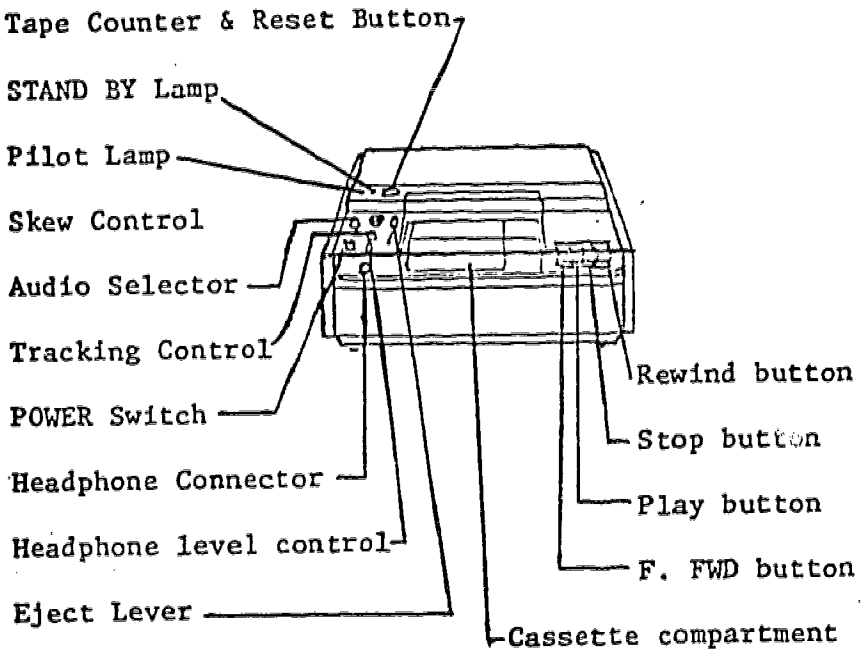
(h) If two integers have unlike signs, then their product is a negative integer

(i) If two integers are positive, then their quotient is a positive number

(j) If two integers are negative, then their quotient is a positive number

(k) If two integers have unlike signs, then their quotient is a negative number

CASSETTE VIDEO TAPE PLAYBACK INSTRUCTIONS



1. Depress the POWER switch to turn on the VP-1000. The green pilot lamp will light. Turn the TV set on.

2. Pull the EJECT lever toward you and insert the VIDEOCASSETTE. Slide it as far as it will go. It will drop into position and the EJECT lever will return to the former position.

3. Push the Tape Counter Reset Button to set the counter to 000.

4. Press the PLAY button. The orange STAND BY lamp will light. After several seconds, the lamp will go out and playback of the VIDEOCASSETTE will begin.

5. The headphone level selector provides two listening levels. The position 2 is the louder.

6. When the tape comes to its end the machine will stop automatically, and the function button will be unlocked. You may also stop the tape at any point by pressing the STOP button.

Rewind and Fast Forward

1. Press the STOP button and wait until the STAND BY lamp goes out signaling the completion of unthreading operation.

2. Press F FWD or REWIND buttons.

3. Press STOP button at the desired point on the tape. The tape will also stop automatically at either end of the tape.

Operating Notes

1. Always wait until the orange STAND BY lamp goes out before trying to eject the VIDEOCASSETTE or initiating fast-forward or rewind operations.

2. Remember to go to stop when changing functions. For example, it is necessary to go to stop, wait until the STAND BY lamp goes out, and then press REWIND, to go from play to rewind.

3. If the machine fails to function as desired when you press the PLAY, REWIND, or F FWD buttons, check to make sure that the tape is not at either end of its travel.

VIDEOCASSETTE Removal

The VIDEOCASSETTE may be removed after the machine has been put into the stop mode, either automatically or by pressing the STOP button.

1. Press the STOP button and wait until the STAND BY lamp goes out. Or if the machine has stopped automatically, check to see that the STAND BY lamp is out before proceeding.

2. Pull the EJECT lever toward you.

3. Remove the VIDEOCASSETTE.

TURN OFF THE VIDEOCASSETTE PLAYBACK UNIT AND THE TV

Index of Revolutions

Video Tape Part B		Revolution
1.	Associative Property (law) of Addition	59
2.	Associative Property (law) of Multiplication	144
3.	Division With Like Signs	45,573
4.	Division With Unlike Signs	528,573
5.	Multiplication With Like Signs	480,555
6.	Multiplication With Unlike Signs	484,550
7.	Solving a Simple Equation When the Distributive Property is Needed	578
8.	Solving Simple Equations	21,475
9.	Using Exponents	376
10.	Using the Distributive Property (law)	192,265,470,578

Video Tape Part C		Revolution
1.	Associative Property (law) of Addition	29
2.	Associative Property (law) of Multiplication	75
3.	Additive Identity	330
4.	Addition With Like Signs	144,373,604
5.	Addition With Unlike Signs	305,658
6.	Commutative Property (law) of Addition	128
7.	Commutative Property (law) of Multiplication	151
8.	Division With Like Signs	315,389
9.	Division With Unlike Signs	613,678
10.	Multiplication With Like Signs	102,261,423
11.	Multiplicative Identity	340

Video Tape Part C - con't.	Revolution
12. Multiplication With Unlike Signs	263,420
13. Solving Simple Equations	295,355,396,458,501, 553,635
14. Using the Distributive Property (law)	185,290,408,553,635

Exercises to be done at the end of each video tape on integers.

Video Tape Part A

Simplify each of the following:

(1) $10 + 6 =$

(2) $11 - 8 =$

(3) $7 + {}^{-}7 =$

(4) $7({}^{-}7) =$

(5) $10 + 0 =$

(6) ${}^{-}4 - 17 =$

(7) ${}^{-}14 + 6 =$

(8) ${}^{-}15 - 30 =$

(9) $({}^{-}13)({}^{-}5) =$

(10) ${}^{-}7 + 8 =$

Simplify each equation to find the integer required to be the solution:

(1) $3x = 39$

(2) $3x + 1 = 34$

(3) $2x + 1 = 35$

(4) $5x + 35 = 15$

Video Tape Part A -- con't.

(5) $10x - 1 = 49$

(6) $-2x + 5 = 35$

At this time you must know the following facts and laws that are illustrated by each of the following matching:

____ 1.	$21 + {}^{-}3 = 18$	(a)	Additive Identity
____ 2.	$(3)(9) = 27$	(b)	Commutative Law of Addition
____ 3.	${}^{-}7 + 7 = 0$	(c)	Additive Inverse
____ 4.	$({}^{-}5)({}^{-}10) = 50$	(d)	If two positive integers are added, their sum is positive
____ 5.	${}^{-}10 + {}^{-}3 = {}^{-}13$	(e)	If two negative integers are added, their sum is a negative integer
____ 6.	$6 + 8 = 8 + 6$	(f)	If a positive integer is added to a negative integer, their sum is a positive integer
____ 7.	$(5)({}^{-}3) = {}^{-}15$	(g)	If a positive integer is added to a negative integer, their sum is a negative integer
____ 8.	$16 + 0 = 16$	(h)	The product of a negative integer and positive integer in a negative integer
____ 9.	${}^{-}6 + 8 = 2$	(i)	The product of two positive integers is a positive integer
____ 10.	$10 + {}^{-}12 = {}^{-}2$	(j)	The product of two negative integers is a positive integer
____ 11.	$(3)(9) = (9)(3)$	(k)	None of the above
____ 12.	$3/3 = 1$		

Video Tape Part B

(1) $^{-}4 + 7 =$

(2) $^{-}15 + 8 =$

(3) $^{-}11 - {}^{-}12 =$

(4) $^{-}11 - 12 =$

(5) $8 - {}^{-}18 =$

(6) $(-3)(-3)(-3)(-3) = (-3)^4$

(7) By the Associative Property of Addition

$(5 + 9) + {}^{-}2 =$ _____

(8) By the Associative Property of Multiplication

$-3(2x) =$ _____

(9) $x^5 \cdot x^{10} =$ _____

(10) Show that $5x + 10x = 15x$ by use of the Distributive Property of Multiplication over Addition.

(11) Simplify: Use the Distributive Property:

(a) $^{-}4(2y + 6) =$ _____

(b) $5(2x + 3y) =$ _____

(c) $3(2x + 1) - 2(x + 6) =$ _____

(12) Find the truth set for each of the following in the set of integers:

(a) $2x + 7 = {}^{-}3$

(b) $5 - 3(2x + 4) = 11$

(c) $5(2x - 3) - 6x = 1$

(d) $8x - 3(4 + 2x) = {}^{-}6$

Video Tape Part C

I. Facts, laws and properties that you must know are illustrated by each of the following matching:

____ 1. $\frac{-7}{-7} = 1$

____ 2. $2 + 6 = 8$ and $6 + 2 = 8$

____ 3. $5(10 + 3) = 5 \cdot 10 + 5 \cdot 3$

____ 4. $(3 \cdot 4) \cdot 5 = 3 \cdot (4 \cdot 5)$

____ 5. $10 + {}^{-}13 = {}^{-}3$

____ 6. $10 + {}^{-}10 = 0$

____ 7. $5({}^{-}7) = {}^{-}35$

____ 8. $\frac{-20}{-4} = 5$

____ 9. $16 + 0 = 16$

____ 10. $5(10) = 50$ and $10(5) = 50$

____ 11. $(-5)(-6) = 30$

____ 12. $\frac{-20}{4} = {}^{-}5$

____ 13. $-30 + 20 = {}^{-}10$

(a) Additive Identity

(b) Associative Property of Addition

(c) Associative Property of Multiplication

(d) Commutative Property of Addition

(e) Commutative Property of Multiplication

(f) Distributive Property

(g) If two negative integers are added, their sum is a negative integer

(h) If a positive and negative integer are added, their sum is positive or negative depending which has the large count

(i) The quotient of an integer and the integer itself is one

(j) The product of two integers with like signs is a positive integer

(k) The product of two integers with unlike signs is a negative integer

(l) The quotient of two integers with like signs is a positive integer

(m) The quotient of two integers with unlike signs is a negative integer

(n) None of the above

Video Tape Part C -- con't.

II. Solve each of the following for the truth set in the integer:

(a) $11 - 2x = x + 8$

(b) $5x - 2x + 7 = 8x + 14 - 6x$

(c) $5x + 3(x + 1) = 19$

(d) $8x - 3(4 + 2x) = -6$

(e) $-7x - 4(2 - 3x) = 16$

Basic Properties and/or Laws

(1) Commutative Property of Addition with Integers

$a + b = b + a$

Illustration:

$5 + 4 = 4 + 5$

$9 = 9$

(2) Commutative Property of Multiplication with Integers

$(a)(b) = (b)(a)$

Illustration:

$(-5)(4) = (4)(-5)$

$-20 = -20$

(3) Associative Property of Addition with Integers

$(a + b) + c = a + (b + c)$

Illustration:

$(3 + 5) + 7 = 3 + (5 + 7)$

$8 + 7 = 3 + 12$

$15 = 15$

(4) Associative Property of Multiplication with Integers

$(a \cdot b) \cdot c = a \cdot (b \cdot c)$

Illustration:

$(3 \cdot 5) \cdot 7 = 3 \cdot 5 \cdot 7$

$15 \cdot 7 = 3 \cdot 35$

$105 = 105$

(5) Distributive Property of Multiplication Over Addition for the Integers

$a \cdot (b + c) = a \cdot b + a \cdot c$

Illustrations:

$3 \cdot (5 + 7) = 3 \cdot 5 + 3 \cdot 7$

$3 \cdot 12 = 15 + 21$

$36 = 36$

$-5 \cdot (^-2 + 3) = ^-5 \cdot ^-2 + ^-5 \cdot 3$

$^-5 \cdot 1 = 10 + ^-15$

$^-5 = ^-5$

Since all subtraction problems may be stated as addition -

$-5 \cdot (7 - 3) = ^-5 \cdot 7 - ^-5 \cdot 3$

$-5(4) = ^-35 + 15$

$^-20 = ^-20$

(6) Additive Identity

$\{0\}$

$a + 0 = a$

Illustration:

$5 + 0 = 5$

(7) Additive Inverse

$a + ^-a = 0$

Illustration:

$10 + ^-10 = 0$

(8) Multiplicative Identity

$1 \cdot a = a \cdot 1 = a$

Illustration:

$1 \cdot 5 = 5 \cdot 1 = 5$

(9) If two integers are positive, their sum is positive.

Illustration:

$10 + 20 = 30$

(10) If two integers are negative, their sum is negative.

Illustrations:

$^{-}10 + {}^{-}20 = {}^{-}30$

or

$^{-}10 - 20 = {}^{-}30$

(11) If the count of the positive integer is more than the count of the negative integer, their sum will be a positive integer.

Illustrations:

$45 + {}^{-}35 = 10$

or

$45 - 35 = 10$

(12) If the count of a positive integer and a negative integer are the same, then their sum is zero.

Illustrations:

$5 + {}^{-}5 = 0$

or

$5 - 5 = 0$

(13) If the count of a positive integer is less than the count of a negative integer, then their sum is a negative integer.

Illustrations:

$3 + {}^{-}10 = {}^{-}7$

or

$3 - 10 = {}^{-}7$

(14) If two integers are positive, then their product is a positive integer.

Illustration:

$(21)(10) = 210$

(15) If two integers are negative, then their product is positive.

Illustration:

$(-13)(-11) = +143$

(16) If two integers have unlike signs, then their product is a negative integer.

Illustrations:

$(-3)(5) = -15$

or

$(10)(-3) = -30$

(17) If two integers are positive, then their quotient is a positive number.

Illustration:

$8/2 = 4$

(18) If two integers are negative, then their quotient is a positive number.

Illustration:

$$\frac{-10}{-2} = 5$$

(19) If two integers have unlike signs, then their quotient is a negative number.

Illustrations:

$$\frac{-10}{2} = -5$$

or

$$\frac{10}{-2} = -5$$

Special Examples

Find the truth set in the set of integers:

1. $4(3 - 2x) - (2 - 5x) = 13$

$4(3 - 2x) - 1(2 - 5x) = 13$ — Insert one in front of the ( )

$4 \cdot 3 - 4 \cdot 2x - 1 \cdot 2 - {}^{-}1 \cdot 5x = 13$ — Use the distributive property

$12 - 8x - 2 + 5x = 13$ — Collect like things

$-3x + 10 = 13$

$-3x + 10 - 10 = 13 - 10$ — Subtract 10 from both sides

$-3x = 3$

$\frac{-3x}{-3} = \frac{3}{-3}$

$x = -1$ $\quad \{-1\}$

2. $2(3x - 4) + 5 = 2x + 5$

$2 \cdot 3x - 2 \cdot 4 + 5 = 2x + 5$ — Use the distributive property

$6x - 8 + 5 = 2x + 5$

$6x - 3 = 2x + 5$ — Collect like things

$6x - 3 + 3 = 2x + 5 + 3$ — Add (+3) to both sides

$6x = 2x + 8$

$6x - 2x = 2x - 2x + 8$ — Subtract (2x) from both sides

$4x = 8$

$\frac{4x}{4} = \frac{8}{4}$ — Divide by (4)

$x = 2$ $\quad \{2\}$

3. $5 + 2(3 - 7x) = 11$

$5 + 6 - 14x = 11$ — Use the distributive property

$11 - 14x = 11$ — Collect like things

$11 - 11 - 14x = 11 - 11$ — Subtract (11) from both sides

$0 - 14x = 0$

$-14x = 0$

$\frac{-14x}{-14} = \frac{0}{-14}$ — Divide both sides by (-14)

$x = \frac{0}{-14}$ — Zero divided by any non-zero integer is zero

or $x = 0$

4. $5(3x - 4) + 2(4 - 2x) = 24$

$15x - 20 + 8 - 4x = 24$ — Use the distributive property

$11x - 12 = 24$ — Collect like things

$11x - 12 + 12 = 24 + 12$ — Add (+12) to both sides

$11x = 36$

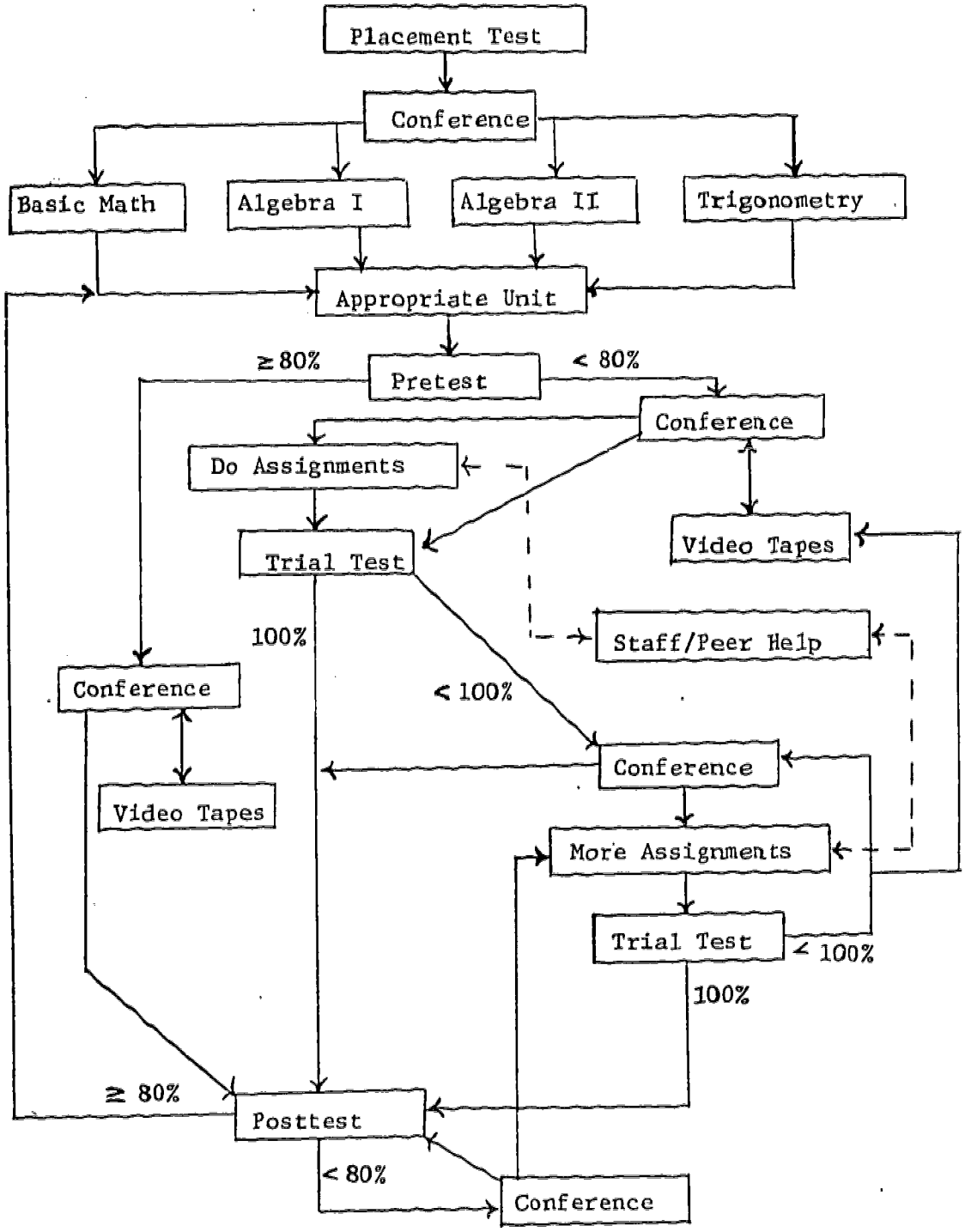
$\frac{11x}{11} = \frac{36}{11}$ — Divide both sides by (11)

$x = ?$

$11\overline{)36}^{\,3}$ (remainder 3) $\rightarrow 3\frac{3}{11}$ is not an integer

Answer is the null set $\{\ \}$

Flow Chart


Placement Test
Conference
Basic Math
Algebra I
Algebra II
Trigonometry
Appropriate Unit
≥ 80%
Pretest
< 80%
Conference
Do Assignments
Trial Test
Video Tapes
100%
Staff/Peer Help
Conference
< 100%
Conference
Video Tapes
More Assignments
Trial Test
< 100%
100%
≥ 80%
Posttest
< 80%
Conference

Answers

Video Tape Part A

1. 16
2. +3
3. 0
4. -49
5. 10
6. -21
7. -8
8. -45
9. 65
10. 1

1. $\frac{3x}{3} = \frac{39}{3}$, $1x = 13$ $\{13\}$
2. $3x + 1 = 34$; $-1 \quad -1$; $3x = 33$, $\frac{3x}{3} = \frac{33}{3}$, $x = 11$ $\{11\}$
3. $2x + 1 = 35$; $-1 \quad -1$; $2x = 34$, $\frac{2x}{2} = \frac{34}{2}$, $x = 17$ $\{17\}$
4. $5x + 35 = 15$; $-35 \quad -35$; $5x = -20$, $\frac{5x}{5} = \frac{-20}{5}$, $x = -4$ $\{-4\}$
5. $10x - 1 = 49$; $1 \quad 1$; $10x = 50$; $x = 5$ $\{5\}$
6. $-2x + 5 = 35$; $-5 \quad -5$; $-2x = 30$, $\frac{-2x}{-2} = \frac{30}{-2}$, $1x = -15$ $\{-15\}$

1. (f)
2. i
3. c
4. j
5. e
6. b
7. h
8. a
9. f
10. g
11. k
12. k

Video Tape Part B

1. 3

2. -7

3. -11 + 12 = 1

4. -23

5. 8 + 18 = 26

6. or + 81

7. 5 +(9 + ⁻2)

8. [(-3)(2)] x

9. x^{15}

10. 5x + 10x = (5 + 10)x = 15x

11.

   a. -8y - 24

   b. 10x + 15y

   c. 6x + 3 - 2x - 12 = 4x - 9

12.

   a. $2x + 7 = {}^{-}3$; $2x = {}^{-}10$; $\frac{2x}{2} = \frac{{}^{-}10}{2}$; $x = {}^{-}5$ $\{-5\}$
   $\quad -7 \quad -7$

   b. $5 - 6x - 12 = 11$; $-6x - 7 = 11$; $-6x = 18$; $\frac{-6x}{-6} = \frac{18}{-6}$, $x = {}^{-}3$ $\{-3\}$
   $\quad\quad\quad\quad\quad\quad\quad\quad 7 \quad 7$

   c. $10x - 15 - 6x = 1$; $4x - 15 = 1$; $4x = 16$; $\frac{4x}{4} = \frac{16}{4}$; $x = 4$ $\{4\}$
   $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 15 \quad 15$

   d. $8x - 12 - 6x = -6$
   $\quad 2x - 12 = -6$; $2x - 12 = -6$; $2x = 6$; $\frac{2x}{2} = \frac{6}{2}$; $x = 3$ $\{3\}$
   $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 12 \quad 12$

Video Tape Part C

1.	l	8.	l
2.	d	9.	a
3.	f	10.	e
4.	c	11.	j
5.	h	12.	m
6.	n	13.	g
7.	k		

a. $11 - 2x = x + 8$; $\begin{array}{rr} 11 - 3x = 8 \\ -11 \quad\quad -11 \end{array}$; $-3x = -3$; $\frac{-3x}{-3} = \frac{-3}{-3}$, $x = 1$ $\{1\}$

b. $3x + 7 = 2x + 14$; $\begin{array}{rr} 3x + 7 = 2x + 14 \\ -7 \quad\quad -7 \\ 3x = 2x + 7 \end{array}$ $\begin{array}{rr} 3x = 2x + 7 \\ -2x \quad -2x \\ 1x = 7 \end{array}$ $\{7\}$

c. $5x + 3x + 3 = 19$; $\begin{array}{r} 8x + 3 = 19 \\ -3 \quad -3 \end{array}$; $8x = 16$

$\frac{8x}{8} = \frac{16}{8}$, $x = 2$ $\{2\}$

d. $8x - 12 - 6x = -6$; $\begin{array}{r} 2x - 12 = -6 \\ 12 \quad 12 \end{array}$; $\frac{2x}{2} = \frac{6}{2}$; $x = 3$ $\{3\}$

$2x = 6$

e. $-7x - 8 + 12x = 16$

$5x - 8 = 16$

$8 \quad 8$

$5x = 24$

$\frac{5x}{5} = \frac{24}{5}$

$x = 4\frac{4}{5}$ $\{\}$

Not an integer

APPENDIX B

DANVILLE COMMUNITY COLLEGE

BONNER AVENUE

DANVILLE, VIRGINIA 24541

DEVELOPMENTAL STUDIES
COMMITTEE

Mr. Bennie L. Griffin (Math)
Miss Jean Jackson (English)
Dr. Norman D. Haar (Psychology)
Mr. Claude S. Moore (Math)

TELEPHONE: (804) 797-3553
EXTENSION: 211

M E M O R A N D U M

TO: Students Participating in Math 01 Experiment
FROM: C. S. Moore, and B. L. Griffin, Directors of Experiment
DATE: January, 1977

You have been asked to participate in an experiment while enrolled in Math 01. We appreciate your willingness to cooperate with us by participating in this experiment.

We believe and hope that you will benefit from this experiment. Your fine cooperation and honest comments may help improve the Math 01 for you and for future students.

You were randomly assigned to the Control Group (A1) which will use the textbook and receive instructor assistance. As a member of this group, you are asked to study the chapter in your textbook and ask for assistance as you need it from your instructor.

If you have comments concerning this experiment, please talk with one of us. (Office: Taylor 107)

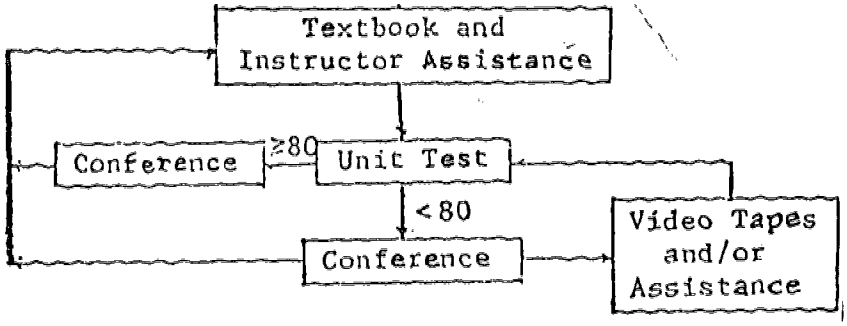
Again, we say THANKS for your help.

pab

CONTROL GROUP (A1)

Book	Chapter	Use Your Textbook	View Video Tapes	Get Instructor Assistance
1	3	Yes	No*	Yes
1	4	Yes	No*	Yes
2	1	Yes	No*	Yes
2	2	Yes	No*	Yes

*After taking each chapter test, you may view the appropriate video tapes if you desire.



STUDY TIME RECORD

DATE	CHAPTER	TIME	DATE	CHAPTER	TIME

DANVILLE COMMUNITY COLLEGE

BONNER AVENUE

DANVILLE, VIRGINIA 24541

DEVELOPMENTAL STUDIES
COMMITTEE

Mr. Bennie L. Griffin (Math)
Miss Jean Jackson (English)
Dr. Norman D. Haar (Psychology)
Mr. Claude S. Moore (Math)

TELEPHONE: (804) 797-3553
EXTENSION: 211

M E M O R A N D U M

TO: Students Participating in Math 01 Experiment
FROM: C. S. Moore, and B. L. Griffin, Directors of Experiment
DATE: January, 1977

You have been asked to participate in an experiment while enrolled in Math 01. We appreciate your willingness to cooperate with us by participating in this experiment.

We believe and hope that you will benefit from this experiment. Your fine cooperation and honest comments may help improve the Math 01 for you and for future students.

You were randomly assigned to the Experimental Group (A2) which will use the textbook and video tapes. As a member of this group, you are asked not to get any help from anyone until after you have studied the chapter in your textbook, viewed the appropriate video tapes, and taken the chapter test.

If you have comments concerning this experiment, please talk with one of us. (Office: Taylor 107)

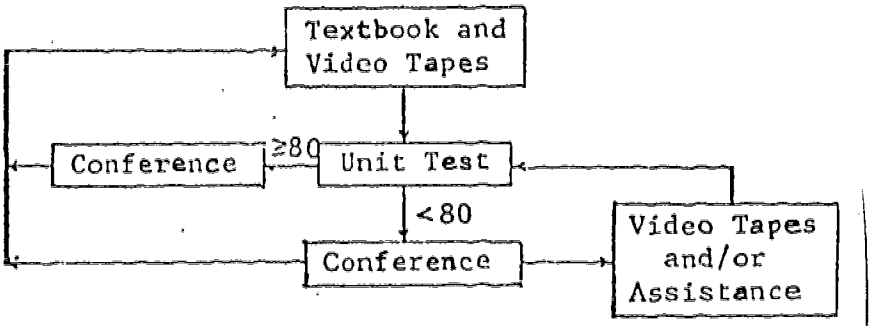
Again, we say THANKS for your help.

pab

EXPERIMENTAL GROUP (A2)

Book	Chapter	Use Your Textbook	View Video Tapes	Get Instructor Assistance
1	3	Yes	Yes	No*
1	4	Yes	Yes	No*
2	1	Yes	Yes	No*
2	2	Yes	Yes	No*

*After taking each chapter test, you may receive instructor assistance if you desire.



STUDY TIME RECORD

DATE	CHAPTER	TIME	DATE	CHAPTER	TIME

DANVILLE COMMUNITY COLLEGE

BONNER AVENUE

DANVILLE, VIRGINIA 24541

DEVELOPMENTAL STUDIES COMMITTEE

Mr. Bennie L. Griffin (Math)
Miss Jean Jackson (English)
Dr. Norman D. Haar (Psychology)
Mr. Claude S. Moore (Math)

TELEPHONE: (804) 797-3553
EXTENSION: 211

M E M O R A N D U M

TO: Students Participating in Math 01 Experiment
FROM: C. S. Moore, and B. L. Griffin, Directors of Experiment
DATE: January, 1977

You have been asked to participate in an experiment while enrolled in Math 01. We appreciate your willingness to cooperate with us by participating in this experiment.

We believe and hope that you will benefit from this experiment. Your fine cooperation and honest comments may help improve the Math 01 for you and for future students.

You were randomly assigned to the Non-Control Group (A3). As a member of this group, you are asked to follow the path below:

	Book	Chapter	Use your Textbook	View Video Tapes	Get Instructor Assistance
	1	3	yes	optional	optional
*	1	4	yes	no	no
	2	1	yes	optional	optional
	2	2	yes	optional	optional

*After taking the chapter test, you may receive assistance or view the tapes if you wish.

If you have comments concerning this experiment, please talk with one of us. (Office: Taylor 107)

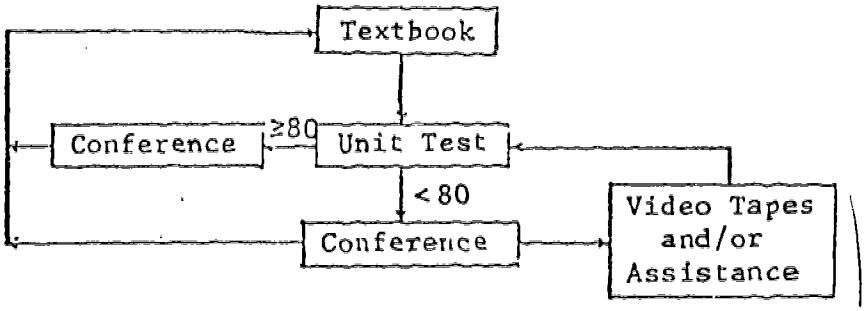
Again, we say THANKS for your help.

pab

NON CONTROL GROUP (A3)

Book	Chapter	Use Your Textbook	View Video Tapes	Get Instructor Assistance
1	3	Yes	Optional	Optional
1	4	Yes	No*	No*
2	1	Yes	Optional	Optional
2	2	Yes	Optional	Optional

*After taking Chapter Test 4, you may view the video tapes and/or get instructor assistance.



STUDY TIME RECORD

DATE	CHAPTER	TIME	DATE	CHAPTER	TIME

I. Evaluate by performing the indicated operations:

1. $^{4}/_{7} + {}^{3}/_{5}$

2. $^{-8}/_{3} + {}^{2}/_{5}$

3. $^{5}/_{4} - {}^{2}/_{3}$

4. $^{6}/_{7} - {}^{-3}/_{5}$

5. $^{-3}/_{5} + {}^{-3}/_{10}$

6. $^{-1}/_{2} - {}^{-3}/_{4}$

7. $^{2}/_{5} \cdot {}^{-4}/_{7}$

8. $^{-9}/_{2} \cdot {}^{4}/_{3}$

9. $(-2)^3$

10. 8^2

II. Simplify by performing the indicated operations:

1. $3x^7 \cdot -2x^2$

2. $-4x^3 / 8x^2$

3. $7x^2 \cdot y^3 / 14x^2y$

4. $5xy^2 \cdot 3xy^4$

5. $-9x^7 / (-3x^3)$

III. Using the set of rational numbers, find the truth set for each of the following equations:

1. $3x + 2 = 17$

2. $4x + 3 = 21$

3. $3x + 1 = x - 7$

4. $2x - 3(x - 4) = 17$

5. $x + {}^{5}/_{3} = {}^{-}2$

6. $({}^{3}/_{5})x = 4$

7. ${}^{4}/_{x} = 7$

8. ${}^{3}/_{x} + {}^{7}/_{x} = 15$

9. $5x - 4 = {}^{-}14$

10. $6x + 19 = 15$

11. $x - 8 = 3x + 8$

12. $4-(7 + 3x) = x$

13. $x - {}^{3}/_{4} = {}^{7}/_{8}$

14. ${}^{-8x}/_{7} = 3$

15. ${}^{-5}/_{x} = {}^{-}9$